Name: _____   Date: _____

Exam: Function Reflections (Solution version 37)

1. Let function f be defined by the polynomial below:

$$f(x) \;=\; 8x^5 + 3x^4 - 4x^3 - 6x^2 + 5x - 2$$

Draw lines that match each function reflection with its polynomial:

Reflections	Polynomials

$-f(-x)$ ●————————————● $8x^5 - 3x^4 - 4x^3 + 6x^2 + 5x + 2$

$f(-x)$ ●————————————● $-8x^5 + 3x^4 + 4x^3 - 6x^2 - 5x - 2$

$-f(x)$ ●————————————● $-8x^5 - 3x^4 + 4x^3 + 6x^2 - 5x + 2$

2. In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.

- $y = g(x)$
- $y = -g(-x)$

- $y = h(x)$
- $y = -h(x)$

- $y = m(x)$
- $y = m^{-1}(x)$

- $y = p(x)$
- $y = p(-x)$

1
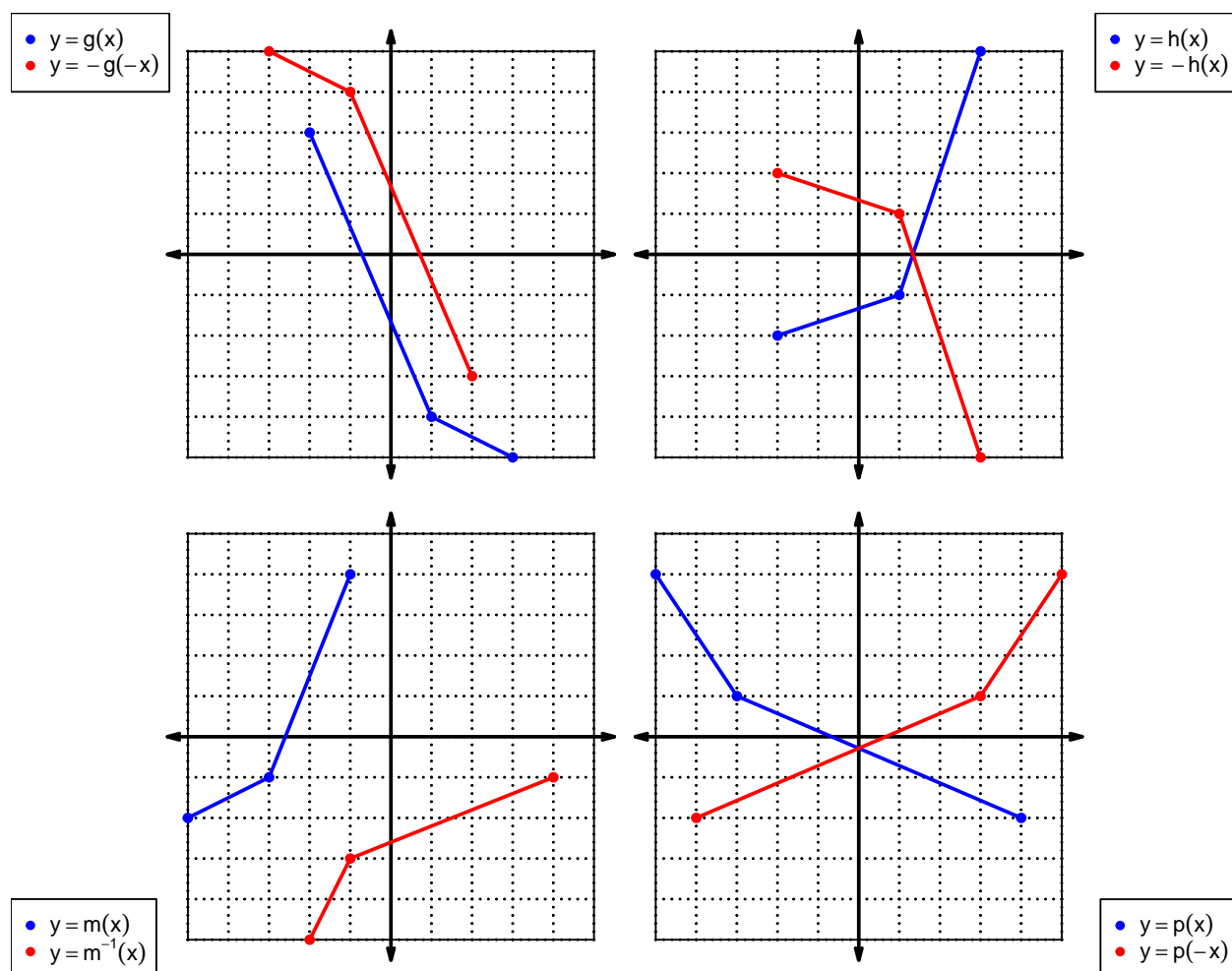
Exam: Function Reflections (Solution version 37)

For all questions on this page, the functions f, g, and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	6	7	9
2	3	4	8
3	8	6	5
4	7	5	3
5	9	2	1
6	4	8	7
7	2	9	6
8	5	1	4
9	1	3	2

3. Evaluate $g(7)$.

$$g(7) = 9$$

4. Evaluate $h^{-1}(4)$.

$$h^{-1}(4) = 8$$

5. By filling more rows of the table, it is possible to make function h **even**. If that were done, what would be the value of $h(-5)$?

If function h is even, then
$$h(-5) = 1$$

6. By filling more rows of the table, it is possible to make function f **odd**. If that were done, what would be the value of $f(-2)$?

If function f is odd, then
$$f(-2) = -3$$

Exam: Function Reflections (Solution version 37)

7. A function, f, is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g, is **odd** if $g(x) = -g(-x)$ for all x in the domain.

Let polynomial p be defined with the following equation:

$$p(x) \;=\; -x^3 - x$$

    a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) \;=\; -(-x)^3 - (-x)$$
$$p(-x) \;=\; x^3 + x$$

    b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) \;=\; -\left(x^3 + x\right)$$
$$-p(-x) \;=\; -x^3 - x$$
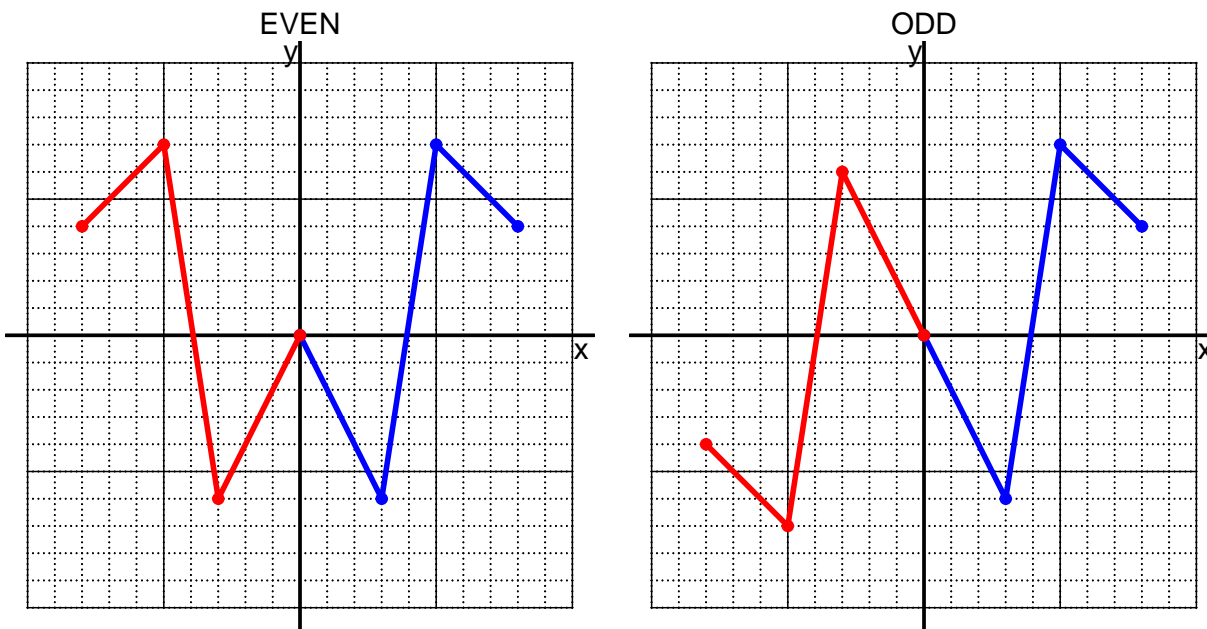
    c. Is polynomial p even, odd, or neither?

odd

    d. Explain how you know the answer to part c.

We see that $p(x) = -p(-x)$ for all x because $p(x)$ and $-p(-x)$ are equivalent polynomials. Thus function p satisfies the criterion for being an odd function.

3

Exam: Function Reflections (Solution version 37)

8. I have drawn half of a function. Draw the other half to make it even or odd.

EVEN

ODD

9. Let function f be defined with the equation below.

$$f(x) = 9x + 4$$

a. Evaluate $f(6)$.

step 1: multiply by 9
step 2: add 4

$$f(6) = 9(6) + 4$$
$$f(6) = 58$$

b. Evaluate $f^{-1}(49)$.

step 1: subtract 4
step 2: divide by 9
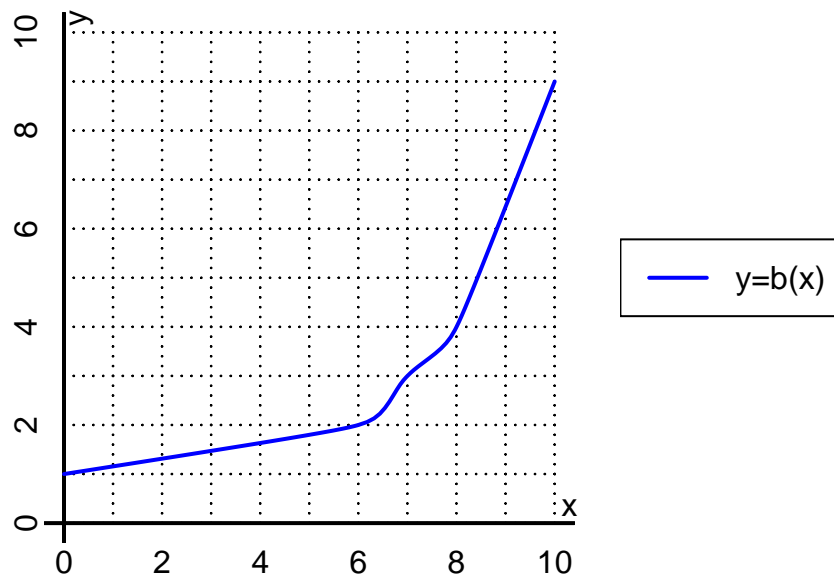
$$f^{-1}(x) = \frac{x - 4}{9}$$
$$f^{-1}(49) = \frac{(49) - 4}{9}$$
$$f^{-1}(49) = 5$$

Exam: Function Reflections (Solution version 37)

10. The function b is represented by the curve $y = b(x)$ graphed below.

a. Evaluate $b(6)$.

$$b(6) = 2$$

b. Evaluate $b^{-1}(3)$.

$$b^{-1}(3) = 7$$

Exam: Function Reflections (Solution version 37)

11. Function f is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	7	-7	-7	7
-1	9	-9	9	-9
0	0	0	0	0
1	9	-9	9	-9
2	-7	7	7	-7

b. Is function f even, odd, or neither?

neither

c. How do you know the answer to part b?

Function f is neither because neither column $-f(-x)$ nor column $f(-x)$ matches column $f(x)$ exactly.